

INTERNATIONAL
STANDARD

ISO
11016

First edition
1999-10-01

**Oil of star anise, Chinese type (*Illicium
verum* Hook. f.)**

Huile essentielle de badiane, type Chine (Illicium verum Hook. f.)

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Reference number
ISO 11016:1999(E)

Foreword

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Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 11016 was prepared by Technical Committee ISO/TC 54, *Essential oils*.

Annexes A and B of this International Standard are for information only.

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Oil of star anise, Chinese type (*Illicium verum* Hook. f.)

1 Scope

This International Standard specifies certain characteristics of oil of star anise¹⁾, Chinese type (*Illicium verum* Hook. f.), in order to facilitate assessment of its quality.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO/TR 210, *Essential oils — General rules for packaging, conditioning and storage.*

ISO/TR 211, *Essential oils — General rules for labelling and marking of containers.*

ISO 212, *Essential oils — Sampling.*

ISO 279, *Essential oils — Determination of relative density at 20 °C (Reference method).*

ISO 280, *Essential oils — Determination of refractive index.*

ISO 592, *Essential oils — Determination of optical rotation.*

ISO 875, *Essential oils — Evaluation of miscibility in ethanol.*

ISO 1041, *Essential oils — Determination of freezing point.*

ISO 11024-1, *Essential oils — General guidance on chromatographic profiles — Part 1: Preparation of chromatographic profiles for presentation in standards.*

ISO 11024-2, *Essential oils — General guidance on chromatographic profiles — Part 2: Utilization of chromatographic profiles of samples of essential oils.*

3 Term and definition

For the purposes of this International Standard, the following term and definition apply.

3.1

oil of star anise, Chinese type

essential oil obtained by steam distillation of the fruit and leaves of *Illicium verum* Hook. f., of the Magnoliaceae family, cultivated mainly in South China

4 Requirements

4.1 Appearance

Clear liquid or crystalline mass.

4.2 Colour

Colourless to light yellow in the liquid state.

4.3 Odour

Characteristic, reminiscent of anethole.

4.4 Relative density at 20 °C, d_{20}^{20}

Minimum: 0,979

Maximum: 0,985

4.5 Refractive index at 20 °C

Minimum: 1,553 0

Maximum: 1,556 0

¹⁾ In French "Badiane" is the usual commercial name for this essential oil. As "badiane" is only the fruit and the essential oil is obtained from the fruit and part of the leaves, it would be more accurate in French to call it "Badianier".

4.6 Optical rotation at 20 °C

Range from -2° to $+2^{\circ}$.

4.7 Miscibility in ethanol [90 % (volume fraction)] at 20 °C

It shall not be necessary to use more than 3 volumes of ethanol [90 % (volume fraction)] at 20 °C to obtain a clear solution with 1 volume of essential oil.

4.8 Freezing point

Minimum: +15 °C.

4.9 Chromatographic profile

Analysis of the essential oil shall be carried out by gas chromatography. In the chromatogram obtained, the representative and characteristic components shown in Table 1 shall be identified. The proportions of these components, indicated by the integrator, shall be as shown in Table 1. This constitutes the chromatographic profile of the essential oil.

Table 1 — Chromatographic profile

Component	Minimum	Maximum
	%	%
α -Pinene	0,1	1,5
α -Phellandrene	—	0,7
Limonene	0,2	6,0
Linalool	0,2	2,5
α -Terpineol	—	0,3
Methylchavicol	0,6	6
<i>cis</i> -Anethole	0,1	1,0
Anisaldehyde	0,1	0,5
<i>trans</i> -Anethole	86	93
β -Caryophyllene	—	0,8
<i>trans</i> - α -Bergamotene	0,06	0,6
<i>cis</i> - α -Bergamotene	0,04	0,09
Foeniculine	0,1	3,0

NOTE The chromatographic profile is normative, contrary to typical chromatograms given for information in annex A.

4.10 Flashpoint

Information on the flashpoint is given in annex B.

5 Sampling

See ISO 212.

Minimum volume of final sample: 30 ml.

NOTE This volume allows each of the tests specified in this International Standard to be carried out at least once.

6 Test methods

6.1 Relative density at 20 °C, d_{20}^{20}

See ISO 279.

6.2 Refractive index at 20 °C

See ISO 280.

6.3 Optical rotation at 20 °C

See ISO 592.

6.4 Miscibility in ethanol [90 % (volume fraction)] at 20 °C

See ISO 875.

6.5 Freezing point

See ISO 1041.

6.6 Chromatographic profile

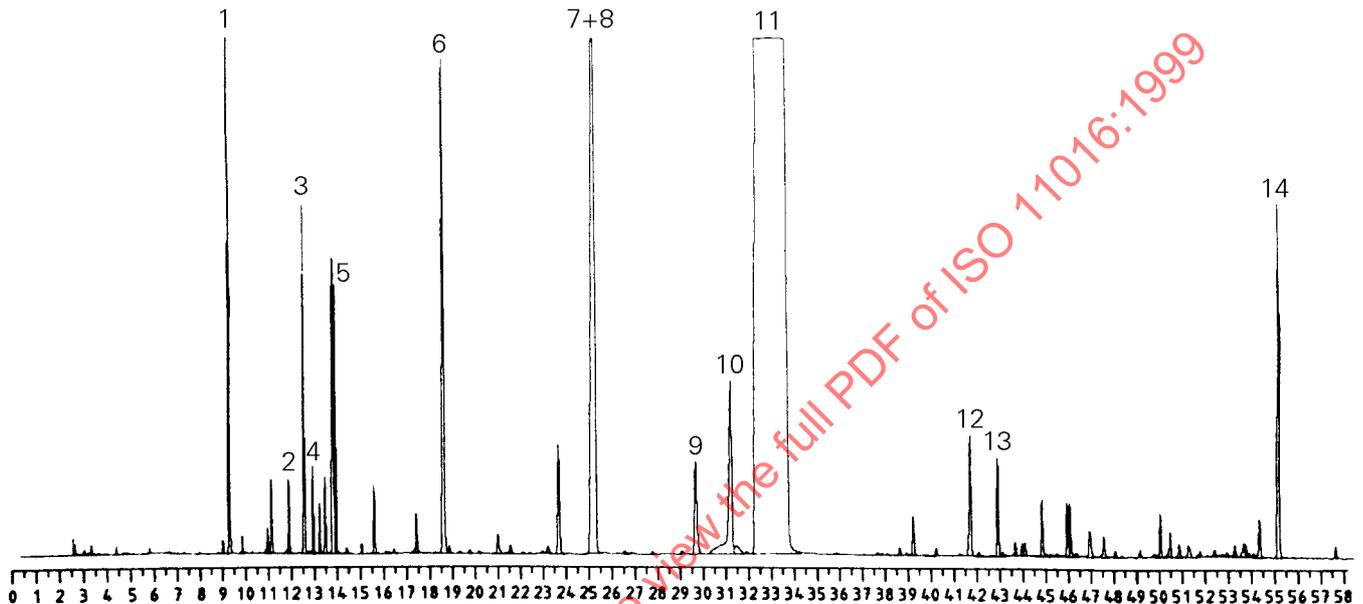
See ISO 11024-1 and ISO 11024-2.

7 Packaging, labelling, marking and storage

See ISO/TR 210 and ISO/TR 211.

Annex A (informative)

Typical chromatograms of the analysis by gas chromatography of the essential oil of star anise, Chinese type (*Illicium verum* Hook. f.)



Peak identification

- 1 α -Pinene
- 2 Myrcene
- 3 α -Phellandrene
- 4 δ -3-Carene
- 5 Limonene
- 6 Linalool
- 7 α -Terpineol
- 8 Methylchavicol
- 9 *cis*-Anethole
- 10 Anisaldehyde
- 11 *trans*-Anethole
- 12 *cis*- α -Bergamotene + β -caryophyllene
- 13 *trans*- α -Bergamotene
- 14 Foeniculine

Operating conditions

Column: , fused silica capillary; length 50 m; internal diameter 0,2 mm
 Stationary phase: OV 101
 Film thickness: 0,25 μ m
 Oven temperature: from 65 °C to 200 °C at a rate of 2 °C/min
 Injector temperature: 230 °C
 Detector temperature: 250 °C
 Detector: flame ionization
 Carrier gas: hydrogen
 Volume injected: 0,2 μ l
 Split ratio: 1/100
 Linear velocity of carrier gas: 0,35 m/s approx.

Figure A.1 — Typical chromatogram taken on an apolar column

**Peak identification**

- 1 α -Pinene
- 2 β -Pinene
- 3 Sabinene
- 4 δ -3-Carene
- 5 Myrcene
- 6 α -Phellandrene
- 7 Limonene
- 8 1,8-Cineole
- 9 Linalool
- 10 *cis*- α -Bergamotene
- 11 *trans*- α -Bergamotene
- 12 Terpinen-4-ol
- 13 β -Caryophyllene
- 14 Methylchavicol
- 15 α -Terpineol
- 16 *cis*-Anethole
- 17 *trans*-Anethole
- 18 Anisaldehyde
- 19 Foeniculine

Operating conditions

Column: capillary; length 30 m; internal diameter 0,25 mm
 Stationary phase: polyethylene glycol 20 000
 Film thickness: 0,25 μ m
 Oven temperature: isotherm for 10 min at 70 °C, then from 70 °C to 220 °C at a rate of 2 °C/min,
 and final isotherm for 20 min at 220 °C
 Injector temperature: 250 °C
 Detector temperature: 250 °C
 Detector: flame ionization type
 Carrier gas: nitrogen
 Volume injected: 0,2 μ l

Figure A.2 — Typical chromatogram taken on a polar column